

## Graphing Simple Rational Functions

Date \_\_\_\_\_ Period \_\_\_\_\_

**Identify the vertical asymptotes, horizontal asymptote, domain, and range of each.**

1)  $f(x) = \frac{4}{x+2} + 1$

Vertical Asym.:  $x = -2$ Horz. Asym.:  $y = 1$ Domain: All reals except  $-2$ Range: All reals except  $1$ 

2)  $f(x) = -\frac{4}{x-2} + 2$

Vertical Asym.:  $x = 2$ Horz. Asym.:  $y = 2$ Domain: All reals except  $2$ Range: All reals except  $2$ 

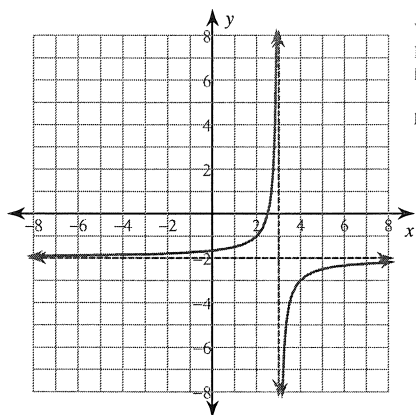
3)  $f(x) = \frac{4}{x} - 2$

Vertical Asym.:  $x = 0$ Horz. Asym.:  $y = -2$ Domain: All reals except  $0$ Range: All reals except  $-2$ 

4)  $f(x) = \frac{4}{x+1}$

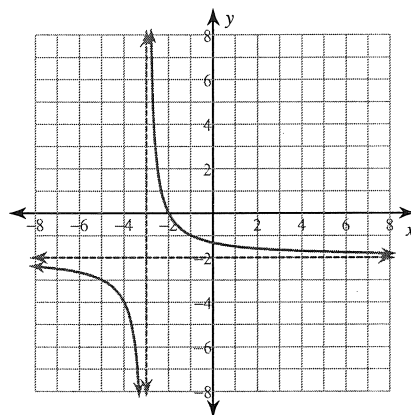
Vertical Asym.:  $x = -1$ Horz. Asym.:  $y = 0$ Domain: All reals except  $-1$ Range: All reals except  $0$ **Identify the vertical asymptotes, horizontal asymptote, domain, and range of each. Then sketch the graph.**

5)  $f(x) = -\frac{1}{x-3} - 2$



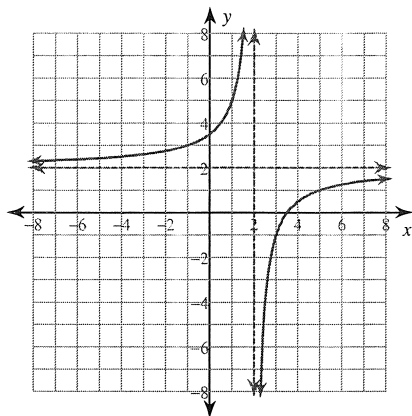
Vertical Asym.:  $x = 3$   
 Horz. Asym.:  $y = -2$   
 Domain:  
 All reals except  $3$   
 Range:  
 All reals except  $-2$

6)  $f(x) = \frac{2}{x+3} - 2$



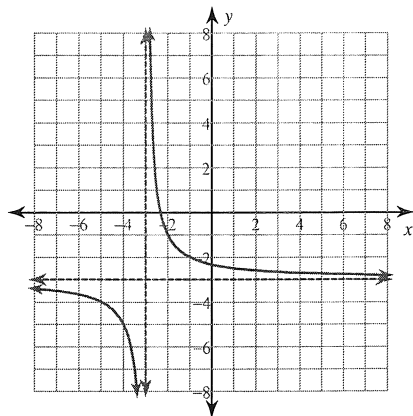
Vertical Asym.:  $x = -3$   
 Horz. Asym.:  $y = -2$   
 Domain:  
 All reals except  $-3$   
 Range:  
 All reals except  $-2$

7)  $f(x) = -\frac{3}{x-2} + 2$



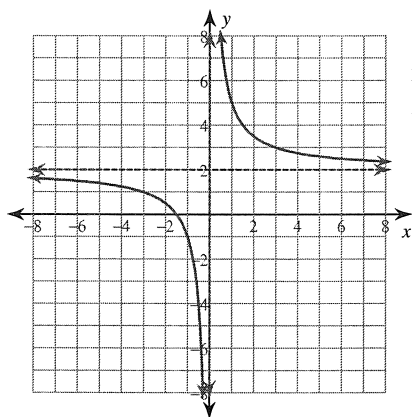
Vertical Asym.:  $x = 2$   
 Horz. Asym.:  $y = 2$   
 Domain:  
 All reals except 2  
 Range:  
 All reals except 2

8)  $f(x) = \frac{2}{x+3} - 3$



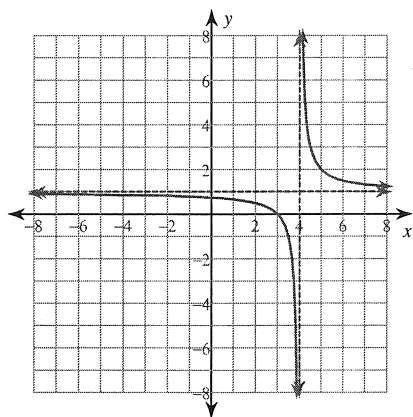
Vertical Asym.:  $x = -3$   
 Horz. Asym.:  $y = -3$   
 Domain:  
 All reals except -3  
 Range:  
 All reals except -3

9)  $f(x) = \frac{3}{x} + 2$



Vertical Asym.:  $x = 0$   
 Horz. Asym.:  $y = 2$   
 Domain:  
 All reals except 0  
 Range:  
 All reals except 2

10)  $f(x) = \frac{1}{x-4} + 1$



Vertical Asym.:  $x = 4$   
 Horz. Asym.:  $y = 1$   
 Domain:  
 All reals except 4  
 Range:  
 All reals except 1

### Critical thinking question:

11) Write a function of the form  $f(x) = \frac{a}{x-h} + k$  with a vertical asymptote at  $x = 25$

Many answers. Ex:  $f(x) = \frac{1}{x-25}$

## Graphing Rational Functions

Date \_\_\_\_\_ Period \_\_\_\_\_

Identify the points of discontinuity, holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each.

1)  $f(x) = \frac{1}{3x^2 + 3x - 18}$

Discontinuities: -3, 2  
 Vertical Asym.:  $x = -3, x = 2$   
 Holes: None  
 Horz. Asym.:  $y = 0$   
 X-intercepts: None

2)  $f(x) = \frac{x-2}{x-4}$

Discontinuities: 4  
 Vertical Asym.:  $x = 4$   
 Holes: None  
 Horz. Asym.:  $y = 1$   
 X-intercepts: 2

3)  $f(x) = \frac{x^3 - x^2 - 6x}{-3x^2 - 3x + 18}$

Discontinuities: 2, -3  
 Vertical Asym.:  $x = 2, x = -3$   
 Holes: None  
 Horz. Asym.: None  
 X-intercepts: 0, -2, 3

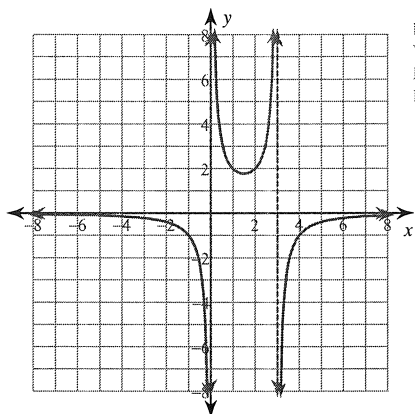
4)  $f(x) = \frac{x^2 + x - 6}{-4x^2 - 16x - 12}$

Discontinuities: -1, -3  
 Vertical Asym.:  $x = -1$   
 Holes:  $x = -3$   
 Horz. Asym.:  $y = -\frac{1}{4}$

X-intercepts: 2

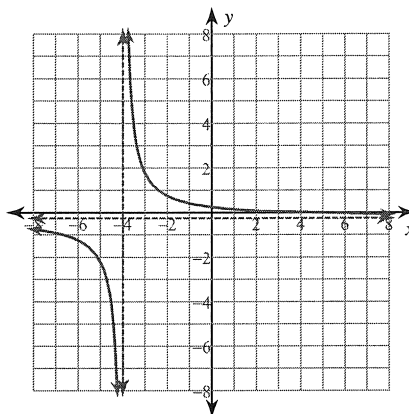
Identify the points of discontinuity, holes, vertical asymptotes, and horizontal asymptote of each. Then sketch the graph.

5)  $f(x) = -\frac{4}{x^2 - 3x}$



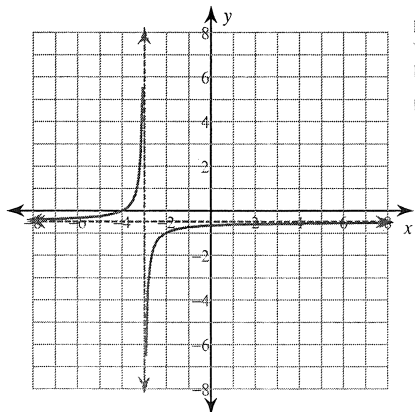
Discontinuities: 0, 3  
 Vertical Asym.:  $x = 0, x = 3$   
 Holes: None  
 Horz. Asym.:  $y = 0$

6)  $f(x) = \frac{x-4}{-4x-16}$



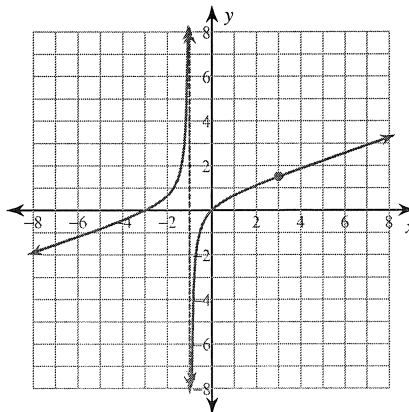
Discontinuities: -4  
 Vertical Asym.:  $x = -4$   
 Holes: None  
 Horz. Asym.:  $y = -\frac{1}{4}$

7)  $f(x) = \frac{x+4}{-2x-6}$



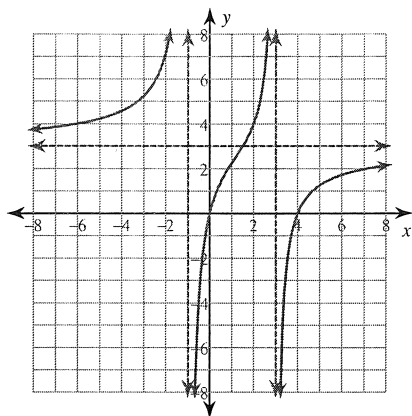
Discontinuities: -3  
 Vertical Asym.:  $x = -3$   
 Holes: None  
 Horz. Asym.:  $y = -\frac{1}{2}$

8)  $f(x) = \frac{x^3 - 9x}{3x^2 - 6x - 9}$



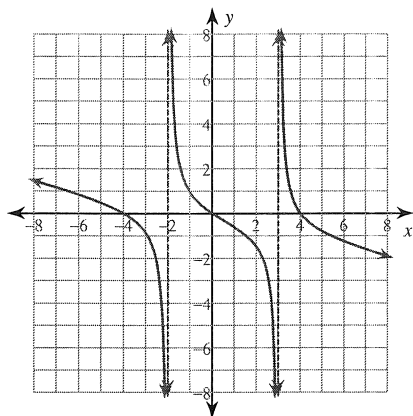
Discontinuities: -1, 3  
 Vertical Asym.:  $x = -1$   
 Holes:  $x = 3$   
 Horz. Asym.: None

$$9) f(x) = \frac{3x^2 - 12x}{x^2 - 2x - 3}$$



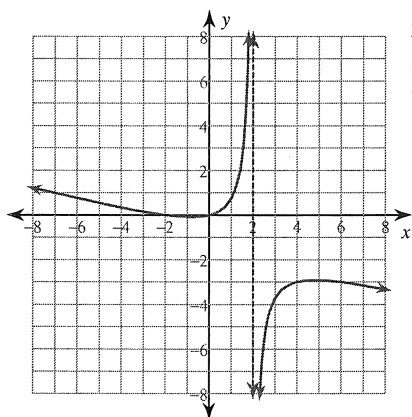
Discontinuities: -1, 3  
Vertical Asym.:  $x = -1, x = 3$   
Holes: None  
Horz. Asym.:  $y = 3$

$$10) f(x) = \frac{x^3 - 16x}{-4x^2 + 4x + 24}$$



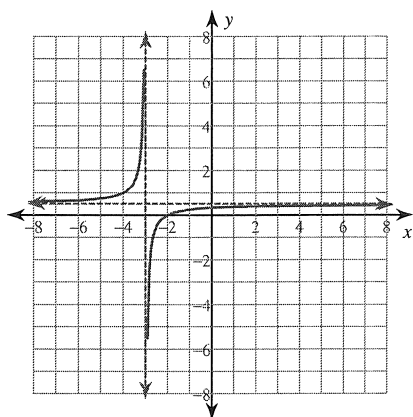
Discontinuities: 3, -2  
Vertical Asym.:  $x = 3, x = -2$   
Holes: None  
Horz. Asym.: None

$$11) f(x) = \frac{x^2 + 2x}{-4x + 8}$$



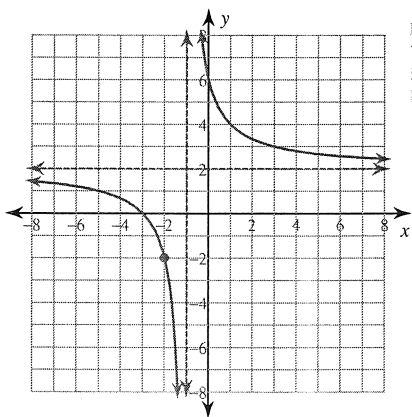
Discontinuities: 2  
Vertical Asym.:  $x = 2$   
Holes: None  
Horz. Asym.: None

$$12) f(x) = \frac{x + 2}{2x + 6}$$



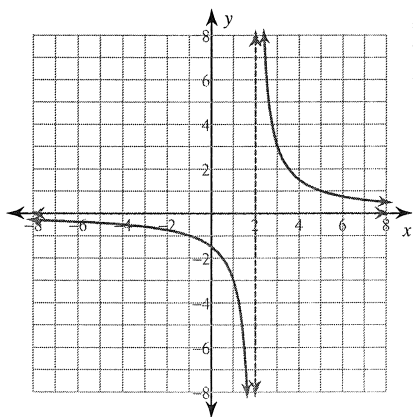
Discontinuities: -3  
Vertical Asym.:  $x = -3$   
Holes: None  
Horz. Asym.:  $y = \frac{1}{2}$

$$13) f(x) = \frac{2x^2 + 10x + 12}{x^2 + 3x + 2}$$



Discontinuities: -1, -2  
Vertical Asym.:  $x = -1$   
Holes:  $x = -2$   
Horz. Asym.:  $y = 2$

$$14) f(x) = \frac{3}{x - 2}$$



Discontinuities: 2  
Vertical Asym.:  $x = 2$   
Holes: None  
Horz. Asym.:  $y = 0$